APPENDIX A
Descriptions of Bailey's Ecoregions
(McNab and Avers 1994)

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Southeastern Mixed Forest

Mid Coastal Plains, Western (Section 231E)

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Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform occupying about 80% of the Section consists of moderately dissected irregular plains of marine origin. The plains were formed by deposition of continental sediments onto submerged, shallow continental shelf, which was later exposed by sea level subsidence. Other landforms consist of plains with hills and smooth plains. Elevations range from 80 to 650 ft (25 to 200 m). Local relief ranges from 100 to 300 ft (30 to 90 m).

Lithology and Stratigraphy. Rock units formed during the Cenozoic Era. Strata consist of Tertiary marine deposits (glauconitic sands and clays with lenses of coquinid limestone; clay and silty clay).

Soil Taxa. Soils are predominantly Udults. Paleudults, Hapludults, Hapludalfs, Paleudalfs, and Albaqualfs are on uplands. Fluvaquents, Udifluvents, Eutrochrepts, and Glossaqualfs are on bottom lands along major streams. Soils have a thermic temperature regime, a udic moisture regime, and siliceous or mixed mineralogy. Most soils have formed from sandstone and shale parent materials. Soils are generally coarse textured, deep, and have adequate moisture for plant growth during the growing season.

Potential Natural Vegetation. Kuchler mapped this area as oak-hickory-pine forest, southern mixed forest, and southern floodplain forest. The predominant vegetation form consists of needle-leaved evergreen trees. Belts of cold deciduous, broad-leaved hardwoods are prevalent along rivers. The principal forest cover type is loblolly and longleaf pines. Where hardwoods are prevalent, species consist of post, white, blackjack, and southern red oaks. Species of bottom lands are red maple, green ash, Nuttall oak, sweetgum, and swamp hickory.

Fauna. The elk, mountain lion, wolf, Carolina parakeet, and ivory-billed woodpecker once inhabited this Section. Presently, the fauna include white-tailed deer, black bear, bobcat, gray fox, raccoon, cottontail rabbit, gray squirrel, fox squirrel, striped skunk, swamp rabbit, and many small rodents and shrews. The turkey, bobwhite, and mourning dove are game birds in various parts of this Section. In flooded areas, ibises, cormorants, herons, egrets, and kingfishers are common. Songbirds include the red-eyed vireo, cardinal, tufted titmouse, wood thrush, summer tanager, blue-gray gnatcatcher, hooded warbler, and Carolina wren. The herpetofauna include the box turtle, common garter snake, and timber rattlesnake.

Climate. Annual precipitation averages 40 to 54 inches (1,000 to 1,300 mm). Temperature averages 61 to 68 F (16 to 20 C°). The growing season lasts about 200 to 270 days.

Surface Water Characteristics. There is a moderate density of small to medium size perennial streams and associated rivers, most with moderate volume of water flowing at low velocity. Dendritic drainage pattern has developed. Major rivers draining this Section include the Red and Ouachita.

Disturbance Regimes. Fire has probably been the principal historical disturbance. Climatic influences include occasional summer droughts and winter ice storms, and infrequent hurricanes. Insect disturbances are often caused by southern pine beetles.

Land Use. Natural vegetation has been cleared for agriculture on about 25% of the area. Much of the non-cleared land is managed for forestry.

Eastern Gulf Prairies and Marshes (Section 231F)

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform is a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto submerged, shallow continental shelf, which was later exposed by sea level subsidence. Along the coast, fluvial deposition and shore zone processes are active in developing and

maintaining beaches, swamps, and mud flats. Elevation ranges from 10 to 330 ft (3 to 100 m). Local relief ranges from 0 to 100 ft (0 to 30 m).

Lithology and Stratigraphy. Rock units formed during the Cenozoic Era. Strata consist of Quaternary marine deposits (non-glacial sand, silt, and clay deposits of upland origin).

Soil Taxa. Aquolls, Saprists, Aquents, and Hemists are the principal soils along the coast. Also along the coast are Aquolls, Haplaquolls, Medisaprists, Hydraquents, and Medihemists, all of which are poorly drained and subject to flooding and high water tables. These soils have a thermic temperature regime and an aquic moisture regime. Farther inland, Uderts and Aqualfs are the main soils, especially where saline prairie vegetation is present. Soils farther inland on low lands are Pelluderts, Pellusterts, Albaqualfs, Ochraqualfs, and Glossaqualfs. Situated on flood plains are Argiaquolls, Haplaquolls, and Haplaquepts. Soils have a thermic to hyperthermic moisture regime, and an aquic moisture regime. These soils are deep, clayey, poorly drained, and have subsoils that are slowly permeable.

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Potential Natural Vegetation. Kuchler classified vegetation as bluestem-sacahuista prairie and southern cordgrass prairie. Predominant vegetation is mid to tall grass grasslands. Species consist of little bluestem, indiangrass, switchgrass, and big bluestem. Occasional areas of live oak are present. Poorly drained areas along the coast support freshwater and saltwater marsh vegetation of sedges, rushes, saltgrass, and cordgrass.

Fauna. Typical large herbivores and carnivores include manatee, coyote, red wolf, ringtail, ocelots, and river otter. Smaller herbivores include swamp rabbit, fulvous harvest mouse, eastern wood rat, and nutria. Common birds of freshwater marshes, lakes, ponds, and rivers include reddish egret, white-faced ibis, white-fronted goose, and olivaceous cormorant. Attwater's prairie chicken was once common in the grasslands. Reptiles and amphibians include American alligator, Gulf coast salt marsh snake, Gulf coast toad and pig frog, diamondback terrapin, Mediterranean gecko, and the Texas horned lizard.

Climate. Average annual precipitation is from 30 to 55 inches (750 to 1,400 mm). Temperature averages 66 to 74 F (19 to 23 C°). The growing season lasts 250 to 330 days.

Surface Water Characteristics. There is a moderate density of small to medium size perennial streams and very low density of associated rivers; most have a moderate volume of water at very low velocity. Water table is high in many areas, resulting in poor natural drainage and abundance of wetlands. Poorly defined drainage pattern has developed on this very young, weakly dissected plain. Abundance of palustrine systems having seasonally high water level. This Section adjoins the Louisianian Marine and Estuarine Province delineated by the USDI FWS.

Disturbance Regimes. Fire and ocean tides have likely been the principal historical disturbance. Climatic influences include occasional hurricanes.

Land Use. Natural vegetation has been cleared for agricultural crops on about 40% of the area.

Outer Coastal Plain Mixed Forest

Louisiana Coast Prairies and Marshes (Section 232E)

Geomorphology. This Section is in the Coastal Plains geomorphic Province. The predominant landform is a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto submerged, shallow continental shelf, which was later exposed by sea level subsidence. Along the coast, fluvial deposition and shore zone processes are active in developing and maintaining beaches, swamps, and mud flats. Elevation ranges from 0 to 160 ft (0 to 50 m). Local relief ranges from 0 to 50 ft (0 to 15 m).

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Lithology and Stratigraphy. Rock units formed during the Cenozoic Era. Strata consist of Quaternary marine deposits of terrestrial origin, non glacial sand, silt, and clay.

Soil Taxa. Aquolls, Saprists, Aquents, and Hemists are the principal soils along the coast. Also along the coast are Aquolls, Haplaquolls, Medisaprists, Hydraquents, and Medihemists, all of which are poorly drained and subject to flooding and high water tables. These soils have a thermic temperature regime and an aquic moisture regime.

Potential Natural Vegetation. Kuchler classified vegetation as bluestem-sacahuista prairie and southern cordgrass prairie. Much of the existing vegetation is nonforested grasslands. Prairie grasslands dominate areas inland from the coast and consist of little bluestem, indiangrass, switchgrass, and big bluestem. Occasional areas of live oak are present. Poorly drained areas along the coast support freshwater and saltwater marsh vegetation of sedges, rushes, saltgrass, and cordgrass.

Fauna. Large herbivores and carnivores include manatee, coyote, red wolf, ringtail, and river otter. Ocelots were once common, but are now rare. Smaller herbivores include swamp rabbit, fulvous harvest mouse, eastern wood rat, and nutria. Birds of fresh water marshes, lakes, ponds, and rivers include reddish egret, white-faced ibis, white-fronted goose, and olivaceous cormorant. Birds of grasslands include Attwater's prairie chicken. Reptiles and amphibians include the Gulf coast salt marsh snake, Gulf coast toad, pig frog, American Alligator, diamondback terrapin, Mediterranean gecko, and Texas horned lizard.

Climate. Annual precipitation averages 25 to 55 inches (620 to 1,400 mm). Temperature averages 68 to 70 F (20 to 21 C°). The growing season lasts 280 to 320 days.

Surface Water Characteristics. There is a moderate density of small to medium size perennial streams and very low density of associated rivers, most with moderate volume of water at very low velocity. Water table is high in many areas, resulting in poor natural drainage and an abundance of wetlands. The Mississippi River flows through this Section into the Gulf of Mexico. Palustrine systems are abundant and have seasonally high water levels. This Section adjoins the Louisianian Marine and Estuarine Province delineated by the USDI FWS.

Disturbance Regimes. Fire and ocean tides have probably been the principal historical disturbance. Climatic influences include occasional hurricanes.

Land Use. Natural vegetation has been converted to agricultural crops on about 40% of the area.

Coastal Plains and Flatwoods, Western Gulf (Section 232F)

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform consists of weakly to moderately dissected irregular plains of alluvial origin formed by deposition of continental sediments onto a submerged, shallow continental shelf, which was later exposed by sea level subsidence. Along the coast, fluvial deposition and shore zone processes are active in developing and maintaining beaches, swamps, and mud flats. About 80% of this Section consists of irregular plains. Other landforms include flat plains and plains with hills. Elevation ranges from 80 to 660 ft (25 to 200 m). Local relief mostly ranges from 100 to 300 ft

(30 to 90 m) on irregular plains; however, relief ranges from 0 to 100 ft (0 to 30 m) on flat plains and 300 to 500 ft (90 to 150 m) where plains with hills are present.

Lithology and Stratigraphy. Rocks in this Section formed during the Cenozoic Era. About 80% of the geologic strata consist of Tertiary marine deposits, including glauconitic, calcareous, and fossiliferous strata with lignitic sandy and argillaceous contents. Quaternary marine deposits are present along the Red River.

Soil Taxa. Soils are mostly Udults. Paleudults, Hapludults, Hapludalfs, Paleudalfs, and Albaqualfs are on uplands. Fluvaquents, Udifluvents, Eutrochrepts, and Glossaqualfs are along major streams. Soils are mostly derived from weathered sandstone and shale. Soils have a thermic temperature regime, a udic moisture regime, and siliceous or mixed mineralogy. Soils are deep, coarsely textured, mostly well drained, and have an adequate supply of moisture for use by vegetation during the growing season.

Potential Natural Vegetation. Kuchler mapped vegetation as southern mixed forest, oak-hickory-pine forest, and southern flood plain forest. The predominant vegetation form is evergreen needle-leaved forest with a small area of cold-deciduous alluvial forest. The slash pine and longleaf pine cover type dominates most of the Section. The loblolly pine-shortleaf pine cover type is common in the northern parts of the Section. A bottomland type is prevalent along most major rivers and consists of cottonwood, sycamore, sugarberry, hackberry, silver maple, and red maple.

Fauna. The elk, mountain lion, wolf, Carolina parakeet, and ivory-billed woodpecker once inhabited this Section. The endangered Florida panther may be encountered rarely. Presently, the fauna include white-tailed deer, black bear, bobcat, gray fox, raccoon, cottontail rabbit, gray squirrel, fox squirrel, striped skunk, swamp rabbit, and many small rodents and shrews. The presence of turkey, bobwhite, and mourning dove is widespread. Resident and migratory nongame bird species are numerous, as are species of migratory waterfowl. In flooded areas, ibises, cormorants, herons, egrets, and kingfishers are common. Songbirds include the red-eyed vireo, cardinal, tufted titmouse, wood thrush, summer tanager, blue-gray gnatcatcher, hooded warbler, and Carolina wren. The endangered red-cockaded woodpecker and bald eagle inhabit this Section. The herpetofauna include the box turtle, common garter snake, eastern diamondback rattlesnake, timber rattlesnake, and American alligator.

Climate. Precipitation averages 40 to 54 inches (1,020 to 1,350 mm) annually. Annual temperature averages 61 to 68 F (16 to 20 C°). The growing season lasts 200 to 270 days.

Surface Water Characteristics. This Section has a moderate density of small to medium size perennial streams and associated rivers. Dendritic drainage pattern has developed without bedrock structural control. Major rivers include the Sabine, Red, and Mississippi.

Disturbance Regimes. Fire has probably been the principal historical disturbance. Climatic influences include occasional summer droughts and winter ice storms and infrequent hurricanes. Insect disturbances are often caused by southern pine beetles.

Land Use. Natural vegetation has been cleared for agriculture on about 60% of the area.

Prairie Parkland (Subtropical)

Cross Timbers and Prairies (Section 255A)

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Geomorphology. This Section is in the Central Lowlands geomorphic province. The predominant landform on about 70% of the Section consists of irregular plains that originated from uplift of level bedded continental sediments, that had been deposited into a shallow inland sea, followed by a long period of erosion. Other landforms include plains with hills and open high hills. Elevation ranges from 330 to 1,300 ft (100 to 400 m). Local relief ranges from 100 to 300 ft (30 to 90 m).

Lithology and Stratigraphy. Rock units were formed during the Paleozoic (30%) and Mesozoic (70%) Eras. Paleozoic strata consist of Pennsylvanian marine deposits (sandstone, shale, coal, and limestone). Mesozoic strata consist of Lower Cretaceous marine deposits (limestone).

Soil Taxa. Soils in the Cross Timbers region are mainly Ustalfs. Paleustalfs and Haplustalfs are on uplands. Ustifluvents and Haplustolls are on narrow flood plains. Soils have a thermic temperature regime, a ustic moisture regime, and mixed or siliceous mineralogy. Soils are deep, well drained, and moderate textured; moisture is limited for use by vegetation during part of the growing season. Soils in the Prairie region are Ustolls, Userts, and Ochrepts. Pellusterts and Chromusterts are on upland valleys. Calciustolls are on smooth uplands. Haplustolls, Calciustolls, and Argiustolls are on areas of limestone parent material. Ustochrepts and Calciustolls occur on steep plateau sideslopes. Haplustolls are on flood plains. Argiustolls and Haplustalfs are on smooth uplands in northern areas of the Section. Soil temperature regime is thermic, moisture regime is ustic, and mineralogy is montmorillonitic, mixed, or carbonatic. Generally, soils are deep, fine textured, and well drained; moisture is limited for use by vegetation during parts of the growing season.

Potential Natural Vegetation. Kuchler classified vegetation as cross timbers *(Quercus-Andropogon*), oak-hickory forest, and oak-hickory-pine forest. The predominant vegetation form is cold-deciduous broad-leaved forest and extensive areas of tall grassland with a tree layer. Forest cover consists of post, live, and blackjack oaks, and pignut and mockernut hickories. Grasses consist of big and little bluestems, indiangrass, and sunflower.

Fauna. Among the fauna in this Section are white-tailed deer, black bear, bobcat, gray fox, raccoon, cottontail rabbit, gray squirrel, fox squirrel, eastern chipmunk, white-footed mouse, pine vole, short-tailed shrew, and cotton mouse. The turkey, bobwhite, and mourning dove are game birds in various parts of this Section. Songbirds include the red-eyed vireo, cardinal, tufted titmouse, wood thrush, summer tanager, blue-gray gnatcatcher, hooded warbler, and Carolina wren. The herpetofauna include the box turtle, common garter snake and timber rattlesnake.

Climate. Precipitation averages 35 to 40 inches (900 to 1,050 mm). About 5 to 18 inches (120 to 450 mm) of snow falls annually. Temperature averages 55 to 63 F (13 to 17 C°). The growing season lasts 190 to 235 days.

Surface Water Characteristics. This Section has a low to moderate density of perennial streams and associated rivers, mostly with low to moderate rates of flow and moderate velocity. Dendritic drainage patterns have developed. One of the major rivers draining this Section is the Red River. A relatively large number of water reservoirs have been constructed.

Disturbance Regimes. Fire and drought have probably been the principal historical sources of disturbance.

Land Use. Natural vegetation has been cleared for agricultural crops on about 75% of the area.

Blackland Prairies (Section 255B)

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform is irregular plains. This Section is an elevated sea bottom that has been shaped by marine and shore-zone processes resulting from repeated episodes of submergence and emergence of the land from the ocean. Some geomorphic processes currently active throughout the area are gentle gradient valley stream erosion, transport and deposition. Elevation ranges from 330 to 660 ft (100 to 200 m). Local relief ranges from 100 to 300 ft.

Lithology and Stratigraphy. Rock units in this Section formed during the Mesozoic (10%) and Cenozoic (90%) Eras. Mesozoic strata consist of Upper Cretaceous marine deposits (shales, marls, and chalks). Cenozoic strata consists of Tertiary marine deposits.

Soil Taxa. Soils are Usterts, Ustolls, Aqualfs, and Ustalfs. Pellusterts are in upland valleys. Chromusterts are on eroded uplands. Haplustrolls and Ustorthents are along an Austin chalk escarpment. Calciustolls and Haplustolls are along stream terraces. Albaqualfs, Ochraqualfs, and Paleustalfs are on uplands. Pelluderts, Haplaquolls, and Chromusterts are on flood plains.

These soils have a thermic temperature regime, a ustic or aquic moisture regime, and montmorillonitic or mixed mineralogy. Generally, soils are deep, mostly well drained, medium to fine textured, and have limited soil moisture supplies for use by vegetation during parts of the growing season.

Potential Natural Vegetation. Kuchler mapped vegetation as blackland prairie (*Andropogon-Stipa*) and juniper-oak savanna. The predominant vegetation form is tall grassland consisting mainly of bunch grasses, such as indiangrass, big bluestem, switchgrass, and eastern gamagrass. A savanna community occurs along many major rivers, consisting of elm, pecan, cottonwood, and hackberry, with grasses between the trees.

Fauna. Faunal communities are characterized by species associated with a prairie climate and vegetation. Typical large herbivores and carnivores include coyote, ringtail, and collared peccary. Smaller herbivores include plains pocket gopher, fulvous harvest mouse, and northern pygmy mouse. Ocelots were once common, but are now rare. The bison is historically associated with the Section. Birds are typical of grass and shrublands; residents include many common species, such as turkey vulture, hairy woodpecker, cardinal, and yellow warbler. Smith's longspur, a bird of the Arctic tundra, winters here. Amphibians and reptiles typical of this area include eastern spadefoot toad, Great Plains narrow-mouthed frog, green toad, Texas toad, Gulf Coast toad, yellow mud turtle, Texas horned lizard, Texas spiny lizard, and Texas blind snake.

Climate. Precipitation ranges from 30 to 45 inches (750 to 1,150 mm), occurring mainly in spring from April through May. Temperature averages 63 to 70 F (17 to 21 C°). The growing season lasts 230 to 280 days.

Disturbance Regimes. Fire and drought have probably been the principal historical sources of disturbance.

Land Use. Natural vegetation has been changed to agricultural crops on about 75% of the area.

Oak Woods and Prairies (Section 255C)

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform on about 80% of the Section consists of irregular plains. Other landforms include plains with hills and smooth plains. This Section is an elevated sea bottom that has been shaped by marine and shore-zone processes resulting from repeated episodes of submergence and emergence of the land from the ocean. Some geomorphic processes currently active throughout

the area are gentle gradient valley stream erosion, transport and deposition. Elevation ranges from 650 to 1,310 ft (200 to 400 m). Local relief ranges from 100 to 300 ft.

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Lithology and Stratigraphy. Rocks units formed during the Cenozoic Era. Strata are Tertiary marine sediments consisting of glauconitic, calcarious, fossiliferous strata with lignitic sandy and argillaceous deposits.

Soil Taxa. Soils are mostly Ustalfs. Paleustalfs and Albaqualfs are on uplands and other areas with thick sandy surface. Pelluderts, Pellusterts, and Hapludolls are on flood plains and clayey terraces along major rivers. These soils have a thermic temperature regime, an ustic moisture regime, and montmorillonitic mineralogy. Soils are deep, medium textured, and generally have a slowly permeable, clayey subsoil. Moisture may be limiting for plant growth during parts of the year.

Potential Natural Vegetation. Kuchler classified vegetation as oak-hickory forest, cross timbers (*Quercus-Andropogon*), and juniper-oak savanna. The predominant vegetation type is cold-deciduous, broad-leaved forest. The oak-hickory cover type consists of scarlet, post, and blackjack oaks, and pignut and mockernut hickories. Forests of elm, pecan, and walnut are in bottomlands. Little bluestem is the dominant grass.

Fauna. Faunal communities are characterized by species associated with a temperate, subhumid, forested environment. Common large herbivores and carnivores include coyote, ringtail, ocelot, and collared peccary. Smaller herbivores include plains pocket gopher, fulvous harvest mouse, northern pygmy mouse, southern short-tailed shrew, and least shrew. Jaguar and bison are historically associated with this Section. Birds typical of this Section include many wide-spread

species, such as eastern bluebird, eastern meadowlark, grasshopper sparrow, mourning dove, Cooper's hawk, and mockingbird. Amphibians and reptiles include eastern spadefoot toad, Great Plains narrow-mouthed frog, green toad, yellow mud turtle, Texas horned lizard, Texas spiny lizard, and Texas blind snake.

Climate. Annual precipitation ranges from 27 to 40 inches (700 to 1,000 mm). Temperature ranges from 63 to 70 F (17 to 21 C°). The growing season lasts 200 to 260 days.

Surface Water Characteristics. There is a low density of small to medium size perennial streams and associated rivers, most with moderate volume of water flowing at low velocity. A major river draining this Section is the Trinity.

Disturbance Regimes. Fire and drought have probably been the principal historical disturbances.

Land Use. Natural vegetation has been converted to agricultural crops on about 75% of the area.

Central Gulf Prairies and Marshes (Section 255D)

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform consists of a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto a submerged, shallow continental shelf, which was later exposed by sea level subsidence. Along the coast, fluvial deposition and shore-zone processes are active in

developing and maintaining beaches, swamps, and mud flats. Elevation ranges from sea level to 160 ft (0 to 50 m). Local relief ranges from 0 to 100 ft.

Lithology and Stratigraphy. Rock units formed during the Cenozoic Era. Strata consist of Quaternary marine deposits (non-glacial sand, silt, and clay deposits) of continental origin.

Soil Taxa. Soils are Aquents, Aqualfs, Aquolls, and Aquepts. Psammaquents, Udipsamments, Fluvaquents, and Salorthids are on barrier islands and long bays. Haplaquolls, Natraqualfs, Pelluderts, and Pellusterts are on low coastal terraces. Ochraqualfs, Albaqualfs, and Paleudalfs are found on plains. Haplaquolls, Haplaquents, and Fluvaquents are on coastal flats and flood plains. These soils have a hyperthermic and thermic temperature regime, an aquic moisture regime, and montmorillonitic, mixed, or siliceous mineralogy. Soils are fine to coarse textured, saline, and mostly poorly drained with high water tables.

Potential Natural Vegetation. Kuchler classified vegetation as bluestem-sacahuista prairie and southern cordgrass prairie. The predominant vegetation form is tall grassland consisting mainly of bunch grasses. Prairie grasslands dominate areas inland from the coast and consist of little bluestem, indiangrass, switchgrass, and big bluestem. Occasional areas of live oak are present. Poorly drained areas along the coast support freshwater and saltwater marsh vegetation of sedges, rushes, saltgrass, and cordgrass.

Fauna. Large to medium size herbivores and carnivores include coyote, ringtail, hog-nosed skunk, river otter, ocelot, and collared peccary. Smaller herbivores include swamp rabbit, plains pocket gopher, fulvous harvest mouse, northern pygmy mouse, and nutria. Bison and jaguar are historically associated with this Section. Birds of fresh water marshes, lakes, ponds, and rivers include reddish egret, white-faced egret, white-fronted goose, and olivaceous cormorant. Birds of these grassland include white-tailed hawk, bronzed cowbird, and Attwater's prairie chicken. The rare whooping crane winters in this Section at the Aransas National Wildlife Refuge. Reptiles include American alligator, Gulf coast salt marsh snake, Mediterranean gecko, keeled earless lizard, Texas horned lizard, Texas spiny lizard, and Texas blind snake. Amphibians common to this Section include Gulf coast toad and diamondback terrapin.

Climate. Annual precipitation ranges from 25 to 55 inches (620 to 1,400 mm). Temperature averages 68 to 70 F (20 to 21 C°). The growing season lasts 280 to 320 days.

Surface Water Characteristics. There is a moderate density of small to medium size perennial streams and a low density of associated rivers, most with moderate volume of water flowing at very low velocity. The water table is high in many areas, resulting in poor natural drainage and abundance of wetlands. A poorly defined drainage pattern has developed on very young plains.

An abundance of palustrine systems are present, having seasonally high water level. This Section adjoins the Carolinian and Louisianian Marine and Estuarine Provinces.

Disturbance Regimes. Ocean tides have probably been the principal historical disturbance. Climatic influences include occasional hurricanes.

Land Use. Natural vegetation has been converted to agricultural crops on about 40% of the area.

Great Plains Steppe and Shrub

Redbed Plains (Section 311A)

Geomorphology. This Section is in the Central Lowlands geomorphic province. Platform uplift of continental sediments deposited previously into a shallow inland sea, followed by a long period of erosion; these processes resulted in a moderately to strongly dissected region. About 70% of this Section consists of irregular plains. Other landforms include about equal areas of plains with low mountains, smooth plains, and tablelands. Elevation ranges from 1,600 to 3,000 ft (500 to 900 m). Local relief in much of the Section ranges from 100 to 300 ft (30 to 90 m). Smaller areas are present where relief ranges from 30 to 60 ft (10 to 20 m) in tablelands and up to 1,000 ft (300 m) in low mountains.

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Lithology and Stratigraphy. Rocks formed during the Paleozoic Era. About 80% of the geologic strata consist of Permian marine deposits (sandstone, shale, and limestone). Other strata include Quaternary marine deposits and small isolated areas of Lower Cretaceous marine deposits (limestone).

Soil Taxa. Soils are Ustolls, Ustalfs, and Ochrepts. Most soils are on uplands and include Argiustolls, Paleustolls, Natrustolls, Haplustalfs, Paleustalfs, and Ustochrepts. Localized areas of Ustifluvents are on flood plains. These soils have a thermic temperature regime, a ustic moisture regime, and mixed mineralogy. Most soils are deep, well drained, variable in texture, and have limited moisture supplies for use by vegetation during part of the growing season.

Potential Natural Vegetation. Kuchler classified vegetation as bluestem-grama prairie, and cross timbers (*Quercus-Andropogon*); shinnery (*Quercus-Andropogon*); and sandsage-bluestem prairie. The predominant vegetation form is medium-tall grasslands with sparse tree cover. Grasses consist mainly of sand bluestem, little bluestem, and sand saltbrush.

Fauna. Representative large to medium size herbivores and carnivores include coyote, ringtail, and ocelot. Small herbivores include eastern cottontail, desert shrew, plains pocket mouse, Texas kangaroo rat, and prairie vole. Bison and black-footed ferret are historically associated with this Section. Common birds of thickets and grasslands include the roadrunner, bobwhite, barn owl, scissor-tailed flycatcher, and common crow. The golden-fronted woodpecker has a more restricted range. Amphibians common to this environment include Plains spadefoot toad, Great Plains narrow-mouthed frog, green toad, spotted chorus frog, and yellow-mud turtle. Typical reptiles include lesser earless lizard, Texas horned lizard, Prairie skink, and Texas blind snake.

Climate. Precipitation averages 20 to 30 inches (500 to 750 mm); snow averages 20 to 30 inches (500 to 750 mm) annually. Temperature averages 57 to 64 F (14 to 18 C°). The growing season lasts 185 to 230 days.

Surface Water Characteristics. The area has a low density of small to medium intermittent streams and associated rivers, most with a low volume of water flowing at low velocity. Dendritic drainage pattern has developed without bedrock structural control. Major rivers include the Washita, Canadian, and Red Rivers.

Disturbance Regimes. Fire and drought have probably been the principal historical disturbances.

Land Use. Natural vegetation has been converted to agricultural crops or pasture on about 90% of the area.

Southwest Plateau and Plains Dry Steppe and Shrub

Texas High Plains (Section 315B)

Geomorphology. This Section is in the Great Plains geomorphic province. The predominant landform consists of a broad, extensive flat plain formed by fluvial sedimentation of continental erosional products from adjacent mountain ranges, followed by sheet erosion and transport. These processes resulted in a region of moderate dissection. Elevation ranges from 2,600 to 6,500 ft (800 to 2,000 m). Local relief in most of the Section ranges from 100 to 300 ft, however, relief in the tablelands ranges from 300 to 500 ft.

Lithology and Stratigraphy. Rocks were formed during the Paleozoic (10%), Mesozoic (10%), and Cenozoic (80%) Eras. Paleozoic strata consist of Permian marine deposits (sandstone, shale, and limestone). Mesozoic strata consist of Triassic continental deposits (sandstone). Cenozoic strata consist of Tertiary Period deposits (poorly consolidated silt, sand, and gravel in varying proportions).

Soil Taxa. Soils are Ustolls and Ustalfs. Paleustolls, Argiustolls, Paleustalfs, and Haplustalfs are on uplands. Calciustolls, Haplustolls, and Paleustolls are on ridges and steeper slopes. Haplustolls occur on young valley floors. Pellusterts are in clayey playa-lake basins. Calciorthids, Paleorthids, and Torriorthents are on steep slopes in breaks. These soils have a mesic or thermic temperature regime, a ustic moisture regime, and mixed or carbonatic mineralogy. Soils are deep, fine to coarse textured, well drained, and have limited soil moisture for use by vegetation during parts of the growing season.

Potential Natural Vegetation. Kuchler classified vegetation as grama-buffalo grass and shinnery (*Quercus-Andropogon*). The predominant vegetation form is short grass communities composed of bunch grasses with a sparse shrub layer. Species include short grasses (blue gramma, and buffalograss), sagebrush, mesquite, and yucca.

Fauna. Typical large to medium size herbivores and carnivores include pronghorn, coyote, swift fox, ringtail, and ocelot. Typical smaller herbivores include desert shrew, desert cottontail, black-tailed prairie dog, yellow-faced pocket gopher, plains pocket mouse, silky pocket mouse, hispid pocket mouse, and white-throated woodrat. Bison are historically associated with this Section. Birds of grasslands include many species that typically occur over a wide area, such as roadrunner, house finch, yellow warbler, willow flycatcher, cedar waxwing, western kingbird, and golden eagle. The lesser prairie chicken, found here, is restricted to the more arid grasslands. Amphibians found in this Section include plains spadefoot toad, Couche's spadefoot toad, western spadefoot toad, plains leopard frog, Great Plains toad, green toad, red spotted toad,

spotted chorus frog, and yellow-mud turtle. Reptiles include species such as Texas horned lizard, round-tailed horned lizard, Great Plains skink, Texas blind snake, and plains black-headed snake.

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Climate. Precipitation averages 14 to 18 inches (350 to 450 mm), occurring mainly in the spring and fall. Temperature averages 55 to 63 F (13 to 17 C°). The growing season lasts 130 to 220 days.

Surface Water Characteristics. There is a low density of small intermittent streams and few associated rivers, all with low volume of water flowing at low velocity. A shallow dendritic drainage pattern has developed. Major rivers include the Canadian and Red. The Canadian River, in north Texas, is deeply incised into the Great Plains plateau and has developed a broad area (up to 50 miles wide) of complex topography locally known as "The Breaks." Playa lakes are common in the western part of this Section.

Disturbance Regimes. Fire and drought have probably been the principal historical disturbances.

Land Use. Natural vegetation has been converted to agricultural crops or pasture on about 90% of the area.

Rolling Plains (Section 315C)

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Geomorphology. This Section is in the Central Lowlands geomorphic province. Landforms originated from platform uplift of continental sediments deposited previously into a shallow inland sea, followed by a long period of erosion. These processes resulted in a moderately dissected landscape. About 80% of this Section is equally divided between irregular plains and tablelands. Smaller areas of smooth plains and plains with hills are also present. Elevation ranges from 1,640 to 2,950 ft (500 to 900 m). Local relief in most of the Section ranges from 100 to 300 ft. Smaller areas are present where local relief ranges from 300 to 500 ft.

Lithology and Stratigraphy. Rocks were formed during the Paleozoic and Mesozoic Eras. Geologic strata consist of about equal amounts of Permian marine deposits and Triassic continental deposits (sandstone). A small area of Permian continental deposits (sandstone, shale, and limestone) is also present.

Soil Taxa. Soils are Ustolls, Ustalfs, and Ochrepts. Most soils are on uplands and include Argiustolls, Paleustolls, and Natrustolls, Haplustalfs, Paleustalfs, and Ustochrepts. Localized areas of Ustifluvents are on flood plains. These soils have a thermic temperature regime, a ustic moisture regime, and mixed mineralogy. Most soils are deep, well drained, variable in texture, and have limited moisture supplies for use by vegetation during part of the growing season.

Potential Natural Vegetation. Kuchler classified vegetation as mesquite-buffalo grass. The predominant vegetation form is medium-tall grassland with a sparse shrub cover. The vegetative community consists of sand and little bluestems and sagebrush.

Fauna. The faunal community consists of species suited to a semi-arid environment. Large to medium-size mammals include coyote, ringtail, ocelot, and collared peccary. Typical smaller herbivores include desert cottontail, hispid pocket mouse, Texas kangaroo rat, Texas mouse, desert shrew, and rock squirrel. Bison and black-footed ferret are historically associated with this Section. Domesticated cattle are the most common large herbivore. Birds of thickets and grasslands include black-capped vireo, Harris' sparrow, scaled quail, golden-fronted woodpecker, and pyrrhuloxia. Amphibians include Couche's spadefoot toad, Great Plains narrow-mouthed frog, green toad, red-spotted toad, and Texas toad. The spotted chorus frog, yellow-mud turtle, and Texas map turtle are in wetter areas. Common reptiles include lesser earless lizard, crevice spiny lizard, Texas spotted whiptail, Great Plains skink, prairie skink, four-lined skink, western hook-nosed snake, Harter's water snake, and plains black-headed snake.

Climate. Precipitation averages 18 to 24 inches (450 to 600 mm). Temperature averages 57 to 64 F (14 to 18 C°). The growing season lasts 185 to 230 days.

Surface Water Characteristics. There is a low density of small intermittent streams and few associated rivers, all with low volume of water flowing at low velocity. A dendritic drainage pattern has developed. Major rivers include the Colorado and Brazos.

Disturbance Regimes. Fire and drought have probably been the principal historical disturbances.

Land Use. Natural vegetation has been converted to agricultural crops or pasture on about 90% of the area.

Edwards Plateau (Section 315D)

Geomorphology. This Section is in the Great Plains geomorphic province. The predominant landform consists of a broad, extensive flat plain formed by fluvial sedimentation of continental erosional products from adjacent mountain ranges, followed by sheet erosion and transport; these processes resulted in a region of moderate dissection. About 90% of this Section consists of landforms equally divided between smooth plains and tablelands having moderate relief. Also included are smaller areas of open high hills, high hills, and plains with hills. Elevation ranges

from 650 to 4,000 ft (200 to 1,200 m). Local relief in most of the Section ranges from 100 to 300 ft (30 to 90 m). In a small area of hills, relief ranges from 300 to 500 ft (90 to 150 m).

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Lithology and Stratigraphy. Rock units in this Section were formed during the Precambrian (10%), Paleozoic (30%), and Mesozoic (60%) Eras. Precambrian strata consist of metamorphic rocks of paragneiss and schist structures and plutonic and intrusive rocks of granitic composition. Paleozoic strata consist of a mixture of Cambrian (carbonates) and lower Ordovician marine deposits (carbonates). Mesozoic strata consist of Cretaceous marine deposits (limestone and sandstone).

Soil Taxa. Soils are mostly Ustolls. Calciustolls are on limestone hills and plateaus. Chromusterts are on outwash plains and broad plateaus. Ustochrepts are on marl and chalk hills. Haplustolls are on stream deposits of valley floors. These soils have a thermic temperature regime, a ustic moisture regime, and carbonatic or montmorillonitic mineralogy. Soils are generally shallow, fine textured, and have limited soil moisture for use by vegetation during parts of the growing season.

Potential Natural Vegetation. Kuchler classified vegetation as juniper-oak savanna and mesquite-acacia-savanna. The predominant vegetation form is mid to short grasslands and evergreen scale-leaved woodlands with a sparse cover of drought-deciduous shrubs. A mixture of species may occur, including blackjack oak, red cedar, mesquite, live oak, and species of mid and short grass grasslands.

Fauna. Common large to medium size herbivores and carnivores include coyote, ringtail, coati, hog-nosed skunk, ocelot, and collared peccary. Smaller herbivores include Mexican ground

squirrel, white-ankled mouse, and prairie vole. Bison are historically associated with this Section. Domesticated cattle are the most common large herbivores. Birds of thickets typically found here include scaled quail, golden-fronted woodpecker, golden-cheeked warbler, pyrrhuloxia, and long-billed thrasher. Amphibians include Couche's spadefoot toad, Rio Grande leopard frog, Great Plains narrow-mouthed frog, green toad, Texas toad, spotted chorus frog, barking frog, cliff chirping frog, and Texas map turtle. A number of salamanders in this Section have a very restricted range: San Marcas, Texas, Cormal blind, Valdina Farms, and Texas blind. Typical reptiles include Mediterranean gecko, spot-tailed earless lizard, keeled earless lizard, Texas spiny lizard, Great Plains skink, and four-lined skink.

Climate. Annual precipitation ranges from 15 to 30 inches (375 to 750 mm). Average temperature is 64 to 68 F (18 to 20 C°). The growing season lasts 230 to 270 days.

Surface Water Characteristics. A low density of small intermittent and occasional perennial streams occurs here. All generally have a low volume of water flowing at low velocity, except along the plateau escarpment, where flow rates can be high. A dendritic drainage pattern has developed. Major rivers include the Brazos and Colorado.

Disturbance Regimes. Fire and drought have probably been the principal historical disturbances.

Land Use. Natural vegetation has been changed to agricultural crops or pasture on about 90% of the area.

Rio Grande Plain (Section 315E)

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform in this Section is a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto submerged, shallow continental shelf, which was later exposed by sea level subsidence. Elevation ranges from 80 to 1,000 ft (25 to 300 m). Local relief in most of the Section ranges from 100 to 300 ft (30 to 90 m).

Lithology and Stratigraphy. Rocks formed during the Cenozoic Era. These strata consist of Tertiary marine deposits (glauconitic, calcareous, fossiliferous layers with lignitic sandy and argillaceous deposits).

Soil Taxa. Soils are Usterts, Torrerts, and Ustalfs. Pellusterts are on plains over clayey marine sediments. Paleustalfs are on eolian plains. Torrerts, Haplustolls, Calciustolls, Paleustalfs, and Haplustalfs are on plains. Calciustolls and Calciorthids are on plains over marine sediments.

Soils have a hyperthermic temperature regime, a ustic or aridic moisture regime, and mixed mineralogy. Soils are mostly deep, fine to coarse textured, well drained, and have limited soil moisture for use by vegetation during the growing season.

Potential Natural Vegetation. Kuchler classified vegetation as mesquite-acacia-savanna and ceniza shrub. The predominant vegetation form is short grassland with a sparse cover of drought deciduous shrubs. Species include mesquite, cactus, and tall and mid grasses. Live oaks and cottonwoods may be present along stream banks.

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Fauna. Typical large to medium size herbivores and carnivores include coyote, ringtail, hog-nosed skunk, and ocelot. Smaller herbivores include Mexican ground squirrel, Texas pocket gopher, and southern plains woodrat. Bats typical of this Section include the ghost-faced and Sanborn's long-nosed. Bison, jaguar, and jaguarundi are historically associated with this Section. This Section and adjacent 315E form the northern range of a number of birds common to Mexico and South America. Typical birds include chachalaca, green kingfisher, pauraque, elf owl, white-winged dove, red-billed pigeon, black-headed oriole, kiskadee flycatcher, yellow-green vireo, Lichtenstein's oriole, tropical kingbird, beardless flycatcher, buff-bellied hummingbird, green jay, long-billed thrasher, and white-collared seedeater. Amphibians include Mexican burrowing toad, Rio Grande leopard frog, sheep frog, giant toad, spotted chorus frog, Mexican tree frog, Rio Grande chirping frog, and Berlandier's tortoise. Reptiles include Texas

banded gecko, reticulate collared lizard, spot-tailed earless lizard, keeled earless lizard, blue spring lizard, mesquite lizard, rose-bellied lizard, Laredo striped whiptail, black-striped snake, indigo snake, speckled racer, and cat-eyed snake.

Climate. Precipitation ranges from 17 to 30 inches (420 to 750 mm), decreasing from east to west and occurring mostly during May and June. Temperature averages 70 to 72 F (21 to 22 C°). The growing season lasts 260 to 310 days.

Surface Water Characteristics. A sparse density of small to medium intermittent streams is present in a dendritic drainage pattern. Major rivers include the Rio Grande and Nueces.

Disturbance Regimes. Drought has probably been the principal historical disturbance.

Land Use. Natural vegetation has been converted to dry-land pasture for cattle grazing on about 90% of the area.

Southern Gulf Prairies and Marshes (Section 315F)

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform consists of a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto a submerged, shallow continental shelf, which was later exposed by sea level

subsidence. Along the coast, fluvial deposition and shore-zone processes are active in developing and maintaining beaches, swamps, and mud flats. Elevation ranges from sea level to 160 ft (0 to 50 m). Local relief ranges from 0 to 50 ft (0 to 18 m).

Lithology and Stratigraphy. Rock units formed during the Cenozoic Era. These strata consist of Quaternary marine deposits of non-glacial sand, silt, and clay.

Soil Taxa. Soils are Aquents, Aqualfs, Aquolls, and Aquepts. Psammaquents, Udipsamments, Fluvaquents, and Salorthids are on barrier islands and long bays. Haplaquolls, Natraqualfs, Pelluderts, and Pellusterts are on low coastal terraces. Ochraqualfs, Albaqualfs, and Paleudalfs are found on plains. Haplaquolls, Haplaquents, and Fluvaquents are on coastal flats and flood plains. These soils have a hyperthermic and thermic temperature regime, an aquic moisture regime, and montmorillonitic, mixed, or siliceous mineralogy. Soils are fine to coarse textured, saline, and mostly poorly drained with high water tables.

Potential Natural Vegetation. Kuchler classified vegetation as bluestem-sacahuista prairie and southern cordgrass prairie. The predominant vegetation form is tall grassland with little tree cover. Grasslands dominate areas inland from the coast and consist of little bluestem, indiangrass, switchgrass, and big bluestem. Occasional areas of live oak are present. Poorly drained areas along the coast support freshwater and saltwater marsh vegetation of sedges, rushes, saltgrass, and cordgrass.

Fauna. The faunal communities typically include coyote, ringtail, hog-nosed skunk, ocelot, and collared peccary. Smaller mammals include Mexican ground squirrel, Texas pocket mouse, northern pygmy mouse, and southern Plains woodrat. Birds of freshwater marshes, lakes, ponds, and rivers include reddish egret, white-faced ibis, black-billed whistling duck, white-fronted goose, and olivaceous cormorant. Reptiles and amphibians include eastern spadefoot toad, Gulf coast toad, American alligator, diamondback terrapin, spiny-tailed iguana, Texas horned lizard, Texas spotted whiptail, and indigo snake.

Climate. Precipitation ranges from 25 to 55 inches (620 to 1,400 mm). Temperature averages 68 to 70 F (20 to 21 C°). The growing season lasts 280 to 320 days.

Surface Water Characteristics. A low density of small to medium perennial streams is present in this Section. The water table is high in many areas, resulting in poor natural drainage and abundance of wetlands. A poorly defined drainage pattern has developed on very young alluvial plains. There is an abundance of palustrine systems with seasonally high water levels. This Section adjoins the West Indian Marine and Estuarine Provinces.

Disturbance Regimes. Ocean tides and grazing have probably been the principal historical disturbance. Climatic influences include occasional hurricanes.

Land Use. Natural vegetation has been changed for agricultural crops on about 40% of the area.

Arizona-New Mexico Mountains Semi-Desert - Open Woodland - Coniferous Forest - Alpine Meadow

Sacramento-Manzano Mountain (Section M313B)

Geomorphology. This Section is in the Basin and Range physiographic province; it is located in central and south-central New Mexico. Major landforms are mountains, hills, plains, and scarps. Major landform features are the Sacramento, Manzano and Sandia Mountains and the Canadian Escarpment. Elevation ranges from 6,000 to 11,000 ft (2,130 to 3,690 m).

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Lithology and Stratigraphy. There are Paleozoic sedimentary and Cenozoic aged igneous rocks and a few metamorphic rocks.

Soil Taxa. Soils include Eutroboralfs, Glossoboralfs, Dystrochrepts, Ustochrepts, Argiustolls, Calciustolls, Haplustolls, and Ustorthents with mesic and frigid temperature regimes and ustic and udic soil moisture regimes. A few Cryoboralfs and Cryochrepts occur with cryic soil temperature regimes and udic soil moisture regimes.

Potential Natural Vegetation. Vegetation consists of ponderosa pine in frigid soil temperature regimes and ustic and udic soil moisture regimes, Douglas-Fir in frigid-udic regimes, pinyon-juniper in mesic-ustic regimes, and Engelmann spruce, and subalpine fir in cryic-udic regimes. A few areas support grey oak at the lowest elevations.

Climate. Precipitation ranges from 12 to 35 inches (305 to 900 mm), with less than half of the precipitation falling during the winter. Temperature averages 40 to 57 F (4 to 8 C°); winter temperatures vary throughout this Section. The growing season lasts less than 70 to 170 days.

Surface Water Characteristics. This Section supplies much of the water to the Rio Grande and Pecos Valley basins. Several streams are perennial.

Disturbance Regimes. Natural fire regime averages 3 to 10 years of frequency in ponderosa pine forests. Much of this area is covered with timber, with some areas of commercial quality. Another use of land is as range.

Cultural Ecology. The earliest human occupation of the Sacramento-Manzano Mountain Section was characterized by an emphasis on big game hunting supplemented with gathering wild plant foods. Evidence for these activities is primarily restricted to the lower elevations and the base of the mountains. Around 6000 B.C., a gradual climate change from cooler and wetter to drier conditions resulted in a change of subsistence patterns. Highly mobile populations hunted and gathered a variety of resources throughout the region. The pinon-juniper zone was intensely exploited for both hunting and gathering. The mixed conifer forests were utilized to some extent for hunting and religious purposes, but the climate and scarcity of resources resulted in only sporadic use. As agriculture became important during the past 2000 years, most of the inhabitants became more sedentary and populations increased. Villages tended to be located close to water in the pinon-juniper woodland and lower alluvial fans at the base of the mountains. Athabascan groups entered the area sometime before the 1600's, utilizing many of the same resources; by the mid 1700's, Comanches occupied the plains immediately to the east. Today, Native Americans continue to use the mountains for gathering and ceremonial purposes.

The earliest historic settlement began in the late 1500's with the Spaniards. A few villages were established in the foothills of the Manzanos, Sandias, and near the headwaters of the Canadian and Pecos Rivers, but the Apaches kept most European settlers out of the Sacramentos and mountain ranges to the south. These settlers concentrated on the pinon-juniper woodlands and grasslands for hunting, fuel wood gathering, post cutting, and small subsistence farming. Beginning in the late 1800's, discoveries of gold and an increase in European

settlement throughout the mountains resulted in more intensive use of the higher elevations for mining, logging, and ranching activities. Most of the homesteads and villages were located in the larger valleys or on the eastern slopes of the mountains near permanent water sources. By the turn of the century, logging dominated the activities in the mixed conifer zone, with ranching still playing an important role throughout the mountains. Currently, the area continues to consist primarily of small rural communities, with logging, fuel wood gathering, ranching, hunting, and recreation as the primary subsistence base. Anglo, Hispanic, and Mescalero Apache cultures are present. Recreational use has increased dramatically over the past few decades, particularly near the larger cities.

Chihuahuan Semi-Desert

Basin and Range (Section 321A)

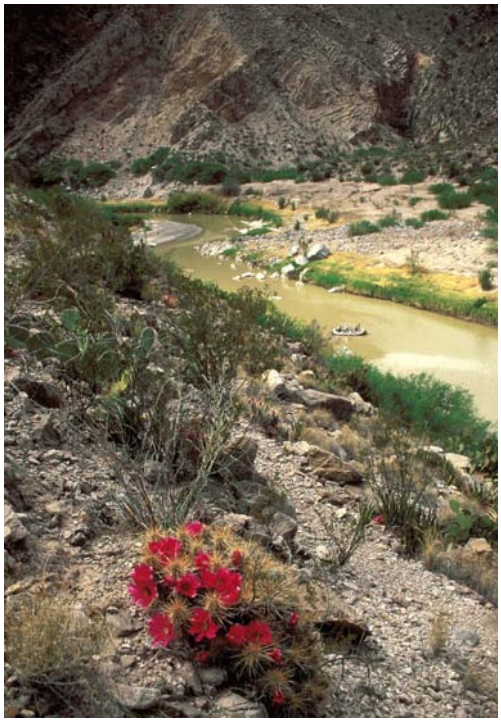

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Geomorphology. This area, which is in the Basin and Range physiographic province, is located in southeast Arizona and southwest and central New Mexico. Relatively recent episodes of continental rifting, volcanism, erosion, and sedimentation have dominated this Section.

Oligocene faulting created the Rio Grande rift in New Mexico and west Texas and initiated volcanism. Subsequent Miocene composite volcanoes emitted silicic lava and ash. Along with Pliocene and Pliestocene mass wasting and cyclic erosion events, and associated with glacial cycles farther north, this combination of processes gradually filled the basins with deep sediments from adjacent mountain ranges. Current erosion cycles dissect these deposits and continue to modify the rift valley through transport and deposition processes. Various landforms comprise about equal areas: (1) plains with low mountains consisting of 50 to 80% of gently sloping area and local relief of 1,000 to 3,000 ft; (2) plains with high hills where relief is 1,000 to 3,000 ft; (3) open high hills with relief of 500 to 1,000 ft; and (4) tablelands with moderate relief averaging 100 to 300 ft. Elevation ranges from 2,600 to 5,500 ft (800 to 1676 m).

Lithology and Stratigraphy. Geologic strata consist of an undifferentiated mixture of Quaternary marine deposits, Miocene volcanic rocks, lower Tertiary volcanic rocks, and Lower Cretaceous marine deposits; Permian marine deposits of Ochoan and Guadalupian series; Paleocene continental deposits; Upper Cretaceous marine deposits; Precambrian plutonic and intrusive granitic rocks; Quarternary volcanic rocks; Permian continental deposits of Wolcampian age, and Miocene felsic volcanic rocks; upper Paleozoic marine deposits; Precambrian sedimentary rocks of Pahrump and Unkar groups; Precambrian Mazatal quartzite, Yavapai series, pinal schist, and metavolcanic formations.

Soil Taxa. Types are mostly Torriorthents with Calciorthids, Haplargids, and some Alfisols (10%) and Mollisols (10%) with a thermic temperature regime, an aridic moisture regime, and mixed or carbonatic mineralogy.

Potential Natural Vegetation. Kuchler mapped vegetation as trans-Pecos shrub savanna (*Flourensia-Larrea*); grama-tobosa desert grasslands; oak-juniper woodland; and mesquite-tarbush desert scrub.

Climate. Precipitation ranges from 8 to 13 inches (200 to 320 mm); it occurs mostly during July and August. Temperature ranges from 55 to 70 F (13 to 20 C°) and winters are mild. The growing season lasts 200 to 240 days.

Surface Water Characteristics. There is a low density of intermittent streams and very few associated rivers, most of which originate in distant mountainous areas. Flow rates are low to moderate, except during periods of heavy rain, when large amounts of surface runoff can occur. Dendritic drainage pattern has developed on dissected mountain slopes, largely without bedrock structural control. Playa lakes are common following periods of rains, but are ephemeral in the hot, dry climate prevalent in this Section.

Disturbance Regimes. Drought has probably been the principal historical source of disturbance.

Land Use. Land use includes range for cattle grazing on about 90% of the area.

Cultural Ecology. The Basin and Range Section is a physiographically diverse area characterized by expansive playas and open grassland basins cut by steep, rugged mountain, mesa, and canyon terrain. Humans have been utilizing the area for 8,000 to 10,000 years, although evidence of occupation prior to 7,000 B.C. remains scarce and scattered. Paleo-Indian materials are especially prevalent, however, from the foothills of the Tularosa Mountains. The area was widely utilized by Cochise and Oshara Tradition Archaic populations between 7,000 B.C. and 200 A.D. Site distribution points to a highly mobile hunting and gathering nomadic subsistence pattern initially, followed by use of increasingly smaller areas and a seasonal cycle of upland and lowland exploitation. Puebloan use and occupation were most prevalent between 200 and 1150 A.D. in the south and 200 and 1400 A.D. in the north. Southern basin, range, and mountain areas supported the Mogollon culture, while more northern mountain areas also included the southern fringe of the Anasazi tradition. Puebloan settlement reflected gradual movement toward major drainages and waterways over time. Basin and range deserts were widely used for wild plant procurement, agriculture, and settlement.

References to the Apache appear in 16th century Spanish documents and later historic accounts. Spanish expeditions passed through the area, but major settlements were restricted to the Rio Grande and the area east of the Mogollon and Tularosa Mountains. Livestock ranching and mining gained prominence in the 1800's. Gold, silver, copper, and turquoise were mined in the Mogollon, Burro, and Black Range Mountains of New Mexico. Introduction of the railroad in the 1800's witnessed an influx of European settlement along the Rio Grande, the southern Burro Mountains (Deming, Lordsburg, and Silver City, New Mexico) and more northern reaches of the Mogollon Mountains. In more northern, remote mountain areas, small ranching, mining, and timber-related settlements were established along major rivers and ephemeral drainages. Ranching and tourism flourish in the area today, and both Anglo and Hispanic cultures influence contemporary life.

Stockton Plateau (Section 321B)

Geomorphology. This Section is in the Great Plains geomorphic province. The predominant landform consists of open high hills with smaller areas of tablelands. These landform were formed by fluvial sedimentation of continental erosional products from adjacent mountain ranges, which was followed by sheet erosion and transport. These processes resulted in a region of shallow dissection. Elevation ranges from 2,600 to 4,500 ft (800 to 1,300 m). Local relief in most of the Section ranges from 500 to 1,000 ft. Relief in a small area of tablelands ranges from 300 to 500 ft.

Photo courtesy Texas Parks and Wildlife Dept. ©2003

Lithology and Stratigraphy. Rocks were formed during Paleozoic (35%), Mesozoic (40%), and Cenozoic (25%) Eras. Paleozoic strata consist of Pennsylvanian marine deposits. Mesozoic strata consist of nondifferentiated mixture of Lower and Upper Cretaceous marine deposits (limestone, and sandstone). Cenozoic strata consist of lower Tertiary volcanic rocks of high alkalic content.

Soil Taxa. Soils are Argids and Orthids. Haplargids, Paleargids, and Calciorthids are on uplands, piedmont plains, and dissected terraces. Calciorthids, Ustolls, and Torriorthents are on uplands with shallow depths to bedrock. Paleorthids are on mesas and terraces. Gypsiorthids are in closed basins. Natragids and Torrerts are on basin floors. Torrifluvents are on flood plains and Torripsamments are on sandy uplands. These soils have a thermic temperature regime, aridic moisture regime, and mixed or carbonatic mineralogy. Soils are well drained, shallow to deep, and medium textured. Soil moisture is limited for use by vegetation during most of the growing season.

Potential Natural Vegetation. Kuchler classified vegetation as trans-Pecos shrub savanna (*Flourensia-Larrea*); with juniper and red cedar woodlands. The predominant vegetation form is short to mid height grasslands with sparse cover of drought-deciduous and scale-leaved shrubs and small trees. Species include desert shrubs in association with short to mid height grasses and oak savannas.

Fauna. Typical large to medium size herbivores and carnivores include pronghorn, coyote, swift fox, ringtail, hooded skunk, ocelot, and collared peccary. Smaller herbivores include desert shrew, desert cottontail, Mexican ground squirrel, yellow-faced pocket gopher, Nelson's pocket mouse, and Merriam's kangaroo rat. Several bats, western mastiff and yuma myotis, are present here. Birds of grasslands include bronzed cowbird, Baird's sparrow, and white-necked raven.

Birds of thickets include black-capped vireo, scaled quail, Harris' hawk, Inca dove, cave swallow, golden-fronted woodpecker, and pyrrhuloxia. Amphibians include Couche's spadefoot toad, western spadefoot toad, Rio Grande leopard frog, Great Plains toad, red-spotted toad, spotted chirping frog, and Mexican mud turtle. Reptiles include Texas banded gecko, Big Bend gecko, desert spring lizard, canyon lizard, crevice spiny lizard, gray checkered whiptail, little striped whiptail, plateau spotted whiptail, checkered whiptail, Texas-Pecos rat snake, gray-banded kingsnake, Big Bend patch-nosed snake, Mexican black-nosed snake, Big Bend black-headed snake, rock rattlesnake, and black-tailed rattlesnake.

Climate. Precipitation ranges from 8 to 13 inches (200 to 320 mm). Temperature ranges from 55 to 64 F (13 to 18 C°). The growing season lasts 200 to 240 days.

Surface Water Characteristics. This section has a low density of intermittent streams that originate in nearby mountainous areas and flow mainly following rains. Major river systems include the Rio Grande and Big Canyon. Flow rates are low except during periods of heavy rain, when large amounts of surface runoff can occur. Dendritic drainage pattern has developed. Playa-type lakes are present following rains but quickly dry up, leaving high salt concentrations.

Disturbance Regimes. This section is part of the Chihuahuan Desert and drought has been the principal disturbance.

Land Use. Cattle grazing occurs on about 90% of the area.

Great Plains-Palouse Dry Steppe

Southern High Plains (Section 331B)

Geomorphology. This Section is in the Great Plains geomorphic province. The predominant landform is a broad, extensive flat plain formed by fluvial sedimentation of continental erosional products from adjacent mountain ranges, followed by sheet erosion and transport. These processes resulted in a region of moderate dissection. Landforms consist mostly of smooth plains with smaller areas of tablelands. Elevation ranges from 2,600 to 4,000 ft (800 to 1,200 m). Local relief ranges mainly from 100 to 300 ft (90 m). A small area of tablelands is present where relief ranges from 300 to 500 ft (90 to 150 m).

Lithology and Stratigraphy. Rocks were formed during the Paleozoic (20%), Mesozoic (20%), and Cenozoic (60%) Eras. Paleozoic strata consist of Permian marine deposits (shale and limestone). Mesozoic strata consists of Upper Cretaceous marine deposits (limestone and sandstone). Cenozoic strata consists of Quaternary continental deposits (poorly consolidated silt, sand, and gravel in varying proportions) and other localized marine deposits.

Soil Taxa. Soils are Ustolls and Ustalfs. Paleustolls, Argiustolls, Paleustalfs, and Haplustalfs are on uplands. Calciustolls, Haplustolls, and Paleustolls are on ridges and steeper slopes. Haplustolls occur on young valley floors. Pellusterts are in clayey playa lake basins. Calciorthids, Paleorthids, and Torriorthents are steep slopes in breaks. These soils have a mesic or thermic temperature regime, an ustic moisture regime, and mixed or carbonatic mineralogy. Soils are deep, fine to coarse textured, well drained, and have limited soil moisture for use by vegetation during parts of the growing season.

Potential Natural Vegetation. Kuchler classified vegetation as sandsage-bluestem prairie and bluestem-grama prairie. The predominant vegetation form is short to mid-height grasslands. Species composition includes bluegrama, buffalograss, hairy grama, and little bluestem.

Fauna. Large to medium size herbivores and carnivores typical of this Section include pronghorn, coyote, and ringtail. Smaller herbivores include desert shrew, black-tailed prairie dog, Plains pocket mouse, silky pocket mouse, and hispid pocket mouse. Bison and black-footed ferret are historically associated with this Section. Birds of grasslands include lesser prairie chicken, Swainson's hawk, and burrowing owl. Typical reptiles and amphibians include Great Plains toad, red spotted toad, lesser earless lizard, round-tailed horned lizard, Great Plains skink, and Plains black-headed snake.

Climate. Annual precipitation averages 16 to 20 inches (400 to 520 mm). Between 16 to 35 in (400 to 900 mm) of snow occurs. Temperature ranges from 50 to 57 F (10 to 14 C°). The growing season lasts 140 to 185 days.

Surface Water Characteristics. There is a low density of small intermittent streams with low volume of water flowing at low velocity. A dendritic drainage pattern has developed on a weakly dissected plateau, largely without bedrock structural control. Major rivers include the Cimarron and North Canadian.

Land Use. Natural vegetation has been converted to agricultural crops and range for cattle grazing on about 90% of the area.